



**S N BOSE NATIONAL CENTRE
FOR BASIC SCIENCES**

Block JD, Sector III, Salt Lake, Kolkata 700 106

DEPARTMENTAL SEMINAR

Physics of Complex Systems

02nd December, 2022

11.30 AM

FERMION

SPEAKER



**Dr. Some Sankar Bhattacharya,
Postdoctoral Research Fellow
Adiunkt, ICTQT, Gdansk, Poland**

TITLE OF THE TALK

**Arbitrary Separation in One-way Zero-error Quantum Communication
Complexity of Relations with Finite Set of Inputs**

ABSTRACT

Communication complexity of functions plays a pivotal role in many computation and communication tasks. In this article we consider communication complexity of relations (CCR), where the receiver outputs one of many correct answers. We show that there exists a class of relations such that there is no advantage when the nature of the communication is quantum. However, a stronger version of the task, where the receiver is required to output all $\{i\}$ correct answers in different runs, entails quantum advantage. We call this task strong communication complexity of relations (S-CCR). Interestingly one of the examples of such a task imply quantum advantage in communication without contextuality. A randomized version of the task unveils curious ordering of communication and shared resources. Besides foundational importance, this work explores a number of applications of S-CCR such as dimension witnesses, detecting nonclassical resources under information constraints and detection of Mutually Unbiased Bases (MUBs).

HOST FACULTY

**Dr. Manik Banik, Associate Professor
DEPT. OF PHYSICS OF COMPLEX SYSTEMS**
